

Amendment and Response

Applicant: Ramiro N. Castellanos et al.

Serial No.: 10/035,592

Filed: October 23, 2001

Docket No.: A126.169.101

Title: SYSTEM AND METHOD FOR INSPECTION USING OFF-ANGLE LIGHTING

REMARKS

The following remarks are made in response to the Non-Final Office Action mailed December 14, 2004. In that Office Action, the Examiner rejected claim 1-11 under 35 U.S.C. § 102(b) as being anticipated by Nishimura et al., U.S. Patent No. 5,761,337 ("Nishimura"). Claims 12-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishimura as applied to claims 1-11 above, and further in view of Eichenlaub, U.S. Patent No. 5,410,345 ("Eichenlaub"). Claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Nishimura in view of Nichani, U.S. Patent No. 6,259,827 ("Nichani"). The Examiner's indication that claims 22-24, although rejected, would be allowable if re-written or amended to independent form, is noted with appreciation. With this Response, claim 25 has been added and claims 1, 2, 9, 11, 12, 18-21 and 24 are amended. Claims 1-25 are pending in the application and are presented for consideration and allowance.

35 U.S.C. §§ 102 & 103 Rejections

The Examiner rejected claim 1 under 35 U.S.C. § 102(b) as anticipated by Nishimura. Claim 1 as amended relates, in part, to a system for inspecting components comprising an image analysis system receiving image data of a component and analyzing the image data utilizing gradient processing to locate the one or more features. For at least the reasons described below, the cited reference fails to teach or suggest the limitations of claim 1 as amended.

In particular, with reference to column 15 line 66 to column 16 line 11, Nishimura describes a process of binarizing image data via thresholding to compare binary data, i.e., a 1 or 0, essentially providing "black and white" data. This does not teach or suggest analysis of a rate of change related to image data or otherwise teach or suggest gradient processing. Indeed, Nishimura more likely teaches away from gradient processing by teaching extraction of low-brightness portions of an image based on such binary image data in order to obtain an outline of a low-brightness portion, for example. Although not referenced by the Examiner in rejecting claim 1, Nichani is similarly limited to binarized data analysis. (See, e.g., Nichani, column 7, lines 35-41). Eichenlaub is also silent as to utilizing gradient processing. This is unsurprising as Eichenlaub addresses a completely different purpose and problem than the present invention, i.e.,

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flat panel autostereoscopic displays as contrasted to systems for inspecting components. (Eichenlaub, Abstract). Therefore, claim 1 as amended is believed to present patentably distinct material from the cited references, as none of those references, either alone or in combination, teach or suggest all the limitations of claim 1 as amended. As such, the Examiner's rejection of claim 1 is respectfully traversed. Withdrawal of the rejection of claim 1 as amended, allowance, and notice to that effect are accordingly requested.

The Examiner also rejected claims 2-8 under 35 U.S.C. § 102(b) as anticipated by Nishimura. Claims 2-8 depend, in some form, from independent claim 1, which as described above is believed to present patentably distinct material over the cited references. As such, withdrawal of the rejection of claims 2-8, allowance of those claims, and notice to that effect are also respectfully requested.

The Examiner rejected claim 9 under 35 U.S.C. § 102(b) as anticipated by Nishimura. Claim 9 as amended relates, in part, to a system for inspecting components comprising an off-axis lighting system illuminating a component with off-axis lighting to allow the component to be inspected to locate one or more features corresponding to a plane of reference, one or more features extending above the plane of reference, and one or more features extending below the plane of reference. The system also comprises an image analysis system receiving image data of a component generated when the component is being illuminated and analyzing at least three relative maxima of histogram data generated from the image data to locate the one or more features, respectively. For at least the reasons described below, the cited reference fails to teach or suggest the limitations of claim 9.

For example, it is believed that Nishimura does not teach or suggest analyzing at least three relative maxima of histogram data. Once again, Nishimura specifically teaches the use of thresholding and analyzing binary image data. (See, e.g., Nishimura, column 9, lines 41-50). Nishimura does not teach or suggest analyzing at least three relative maxima of histogram data to determine a threshold value, or otherwise. Indeed, Nishimura is silent as to how threshold values are to be selected. Furthermore, Nishimura does not mention using such histogram data to locate one or more features corresponding to a plane of reference, one or more features extending above the plane of reference, and one or more features extending below the plane of reference. With

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reference to Nichani, “a single threshold intensity value can be determined from a histogram of Image 3 [of Nichani].” However, this also fails to teach or suggest analyzing at least three relative maxima of histogram data generated from the image data of claim 9 as amended, much less using such histogram data to locate one or more features corresponding to a plane of reference, one or more features extending above the plane of reference, and one or more features extending below the plane of reference. Eichenlaub is also silent as to analyzing at least three relative maxima of histogram data and addresses a purpose or problem unrelated to a system for inspecting components. As none of the cited references, alone or in combination, teach or suggest the limitations of claim 9 as amended, the Examiner’s rejection is respectfully traversed. Withdrawal of the rejection of claim 9 as amended, with concomitant allowance and notice to that effect, is requested.

The Examiner also rejected claims 10 and 11 under 35 U.S.C. § 102(b) as anticipated by Nishimura. Claims 10 and 11 depend, in some form, from independent claim 9, which, as described above, is believed to present patentably distinct material from the cited references. As such, withdrawal of the rejection of claims 10 and 11, allowance of those claims, and notice to that effect are respectfully requested.

The Examiner rejected claim 12 under 35 U.S.C. § 103 as unpatentable over Nishimura in view of Eichenlaub. Claim 12 as amended includes limitations similar to those described above in association with claim 9 as amended. Therefore, it is believed that claim 12 as amended also presents patentably distinct material from the cited references for reasons similar to those discussed in association with claim 9 as amended. Furthermore, Eichenlaub presents non-analogous art as it is not reasonably pertinent to the particular problem with which the invention is concerned. Eichenlaub relates to stroboscopic illumination systems for video displays, and is not otherwise related to inspection systems. At best, Eichenlaub demonstrates that stroboscopic illumination was available at the time of invention. Indeed, the structural differences in the structure and function of the Eichenlaub invention from that of the present invention should be readily understood to render Eichenlaub non-analogous to the present invention. (MPEP § 2141.01(a)). Thus, Eichenlaub is not available as a reference for any rejection under 35 U.S.C. §103.

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As none of the cited references, alone or in combination, teach or suggest the limitations of claim 12 as amended, the Examiner's rejection is respectfully traversed. Withdrawal of the rejection of claim 12 as amended, with concomitant allowance and notice to that effect, is requested.

Claims 13-20 depend, in some form, from claim 12 as amended. Therefore, it is believed that claims 12-20 also present patentably distinct material from the cited references. As such, the Examiner's rejection of claims 12-20 is respectfully traversed. Allowance of those claims and notice that effect are requested.

The Examiner rejected claim 21 under 35 U.S.C. § 103 as unpatentable over Nishimura in view of Nichani. Claim 21 as amended relates, in part, to a system for inspecting components comprising a dual lighting analysis system analyzing image data of a component created when an axial lighting system and an off-axis lighting system are both illuminating the component and generating component acceptance data. For at least the reasons described below, the cited references fail to teach or suggest the limitations of claim 21.

As noted by the Examiner, "Nishimura is silent about a dual lighting analysis system analyzing image data of a component created when the axial lighting system and the off-axis lighting system are both illuminating the component and generating component acceptance data." (NFOA 12-14-04, page 7). However, it is believed that Nichani also fails to teach or suggest such limitations, and in fact, teaches away from the limitations of claim 21. In particular, Nichani specifically states, "[T]he method acquires an image of the semi-conductor die with lighting source 24 or other grazing light.... [T]he method acquires an image of the semiconductor die with on-axis light source 22. Though these images can be acquired at any times [sic] - though not concurrently - they are typically acquired at about the same time." (Nichani at column 6, lines 36-44). Nichani mandates this non-concurrent image acquisition because the method of Nichani particularly relates to image acquisition when a surface is illuminated by one source and subsequent image acquisition when a surface is illuminated by another source. (Nichani at column 5, lines 51-56). As such, Nichani specifically teaches away from a dual lighting analysis system analyzing image data of a component created when an axial lighting system and an off-axis lighting system are both illuminating the component and

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generating component acceptance data. In light of the above clarification it is respectfully believed that the Examiner's rejection of claim 21 is fully traversed. As such, withdrawal of that rejection, allowance of claim 21, and notice to that effect are requested.

With respect to the Examiner's objection to claims 22-24 as being dependent upon a rejected base claim, but otherwise patentably distinct from the cited references, it is believed that independent claim 21 presents patentably distinct material from the cited references as described above. Thus, it is respectfully proffered that the Examiner's objection is overcome. Withdrawal of that objection, allowance of claims 22-24, and notice to that effect is requested.

Newly added claim 25 incorporates limitations addressing band analysis and is believed to present patentably distinct material from the cited references according to the Examiner's comments with respect to claim 22. As such, allowance of newly added claim 25 and notice to that effect are respectfully requested.

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CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 1-25 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1-24 is respectfully requested.

Applicants hereby authorize the Commissioner for Patents to charge Deposit Account No. 50-0471 in the amount of \$125.00 to cover the fees as set forth under 37 C.F.R. § 1.16(b)(c).

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Respectfully submitted,

Ramiro N. Castellanos et al.,

By their attorneys,

DICKE, BILLIG & CZAJA, PLLC

Fifth Street Towers, Suite 2250

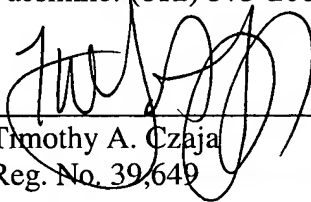
100 South Fifth Street

Minneapolis, MN 55402

Telephone: (612) 573-2004

Facsimile: (612) 573-2005

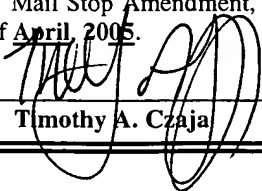
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Timothy A. Czaja
Reg. No. 39,649

CERTIFICATE UNDER 37 C.F.R. § 1.8:

The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 5th day of April, 2005.

By 
Name: Timothy A. Czaja